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Research Article

The Trichoptera of Panama. XXV. Eight new country records of caddisflies (Insecta, Trichoptera)

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Abstract

Herein we add eight new country records to Panama's caddisfly fauna (Insecta, Trichoptera): Hydropsychidae – *Leptonema turrialbum* Flint, McAlpine & Ross, 1987; Polycentropodidae – *Polyplectropus bravoae* Bueno-Soria, 1990; Hydroptilidae – *Mayatrichia ayama* Mosely, 1937 and *Bredinia selva* Harris, Holzenthal & Flint, 2002; Glossosomatidae – *Mortoniella stilula* Blahnik & Holzenthal, 2008; Anomalopsychidae – *Contulma talamanca* Holzenthal & Flint, 1995; Helicopsychidae – *Helicospyche planata* Ross, 1956; and Odontoceridae – *Marilia crea* Mosely, 1949. The Republic of Panama now has 533 species of caddisflies distributed among 15 families and 56 genera.

Key words: Biodiversity, caddisfly, geographic distribution, Neotropics

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Introduction

The Aquatic Invertebrate Research Group (AIRG) at the Universidad Autónoma de Chiriquí (UNACHI) and its Museo de Peces de Agua Dulce e Invertebrados (MUPADI) is currently focused on increasing our knowledge of Trichoptera (caddisflies) and Plecoptera (stoneflies) in Panama. Toward that goal, it has secured registered projects for these two orders of aquatic insects.

A concentrated effort during the last eight years, in part by the AIRG, has more than doubled the known caddisfly fauna of Panama, from 257 to 525 species, distributed among 15 families and 56 genera. Concomitant with the increase in species was the additional gain of two families and 11 genera. These increases were made possible by adoption of an integrated sampling scheme involving multiple sampling methods (primarily UV light traps and Malaise traps, in combination) employed monthly for extended periods (usually January through June) at each collection site. In this paper we add eight new country records of caddisflies from Panama.

Materials and methods

Typically, single, overnight collections were made using UV light traps (Calor and Mariano 2012). Multiple-night collections were made employing Malaise traps over at least seven-day periods. Specimens were prepared and examined following standard methods outlined in Blahnik and Holzenthal (2004). Male genitalia were soaked in 5% KOH overnight, and washed in weakly acidified alcohol prior to examination under a dissecting scope. Altitude values are given in meters above sea level (m a.s.l.). Maps were created in QGIS software, version 3.28.5-Firenze.

Specimens listed in this publication are deposited in MUPADI. The information provided under "Materials examined" for each species reflects the specimen label data. The families, genera, and species listed below are in phylogenetic order Holzenthal et al. (2015).

Results

Eight species of caddisflies new to Panama are listed below. Locations for the respective collection sites are presented in Fig. 1.

Taxonomy

Order Trichoptera Kirby, 1813
Suborder Annulipalpia Martynov, 1924
Superfamily Hydropsychoidea Curtis, 1835
Family Hydropsychidae Curtis, 1835
Subfamily Macronematinae Ulmer, 1905

The family Hydropsychidae is one of the largest families in the Neotropics, with almost 500 species distributed among 15 genera (Holzenthal and Calor 2017). The Neotropical Region hosts four of the five subfamilies in this family (Diplectroninae, Hydropsychinae, Smicrideinae, and Macronematinae). The Macronematinae, one of the most diverse of these subfamilies, is represented by larger caddisflies, commonly seen on walls at night near light sources. The genus *Leptonema* Guerin-Meneville, 1843 in this subfamily is represented in Panama by 17 species (Holzenthal and Calor 2017). Herein we add one new country record to that genus.

***Leptonema turrialbum* Flint, McAlpine & Ross, 1987**

Material examined. PANAMA: Chiriquí Province • ♂; in alcohol; Cuenca 108, Dolega District, Río Majagua, Potrerillos, Banquito de Palmira; 8.68093°N, 82.53276°W; 840 m a.s.l.; Malaise trap; 10–25 Jan. 2020; T. Ríos, Y. Aguirre leg; MUPADI.

Distribution. Costa Rica, Panama. New country record.

Superfamily Psychomyioidea Ivanov, 2002
Famly Polycentropodidae Ulmer, 1903

The Polycentropodidae consists of more than 650 species in 15 genera found in most biogeographic regions (Chamorro and Holzenthal 2011). The genus

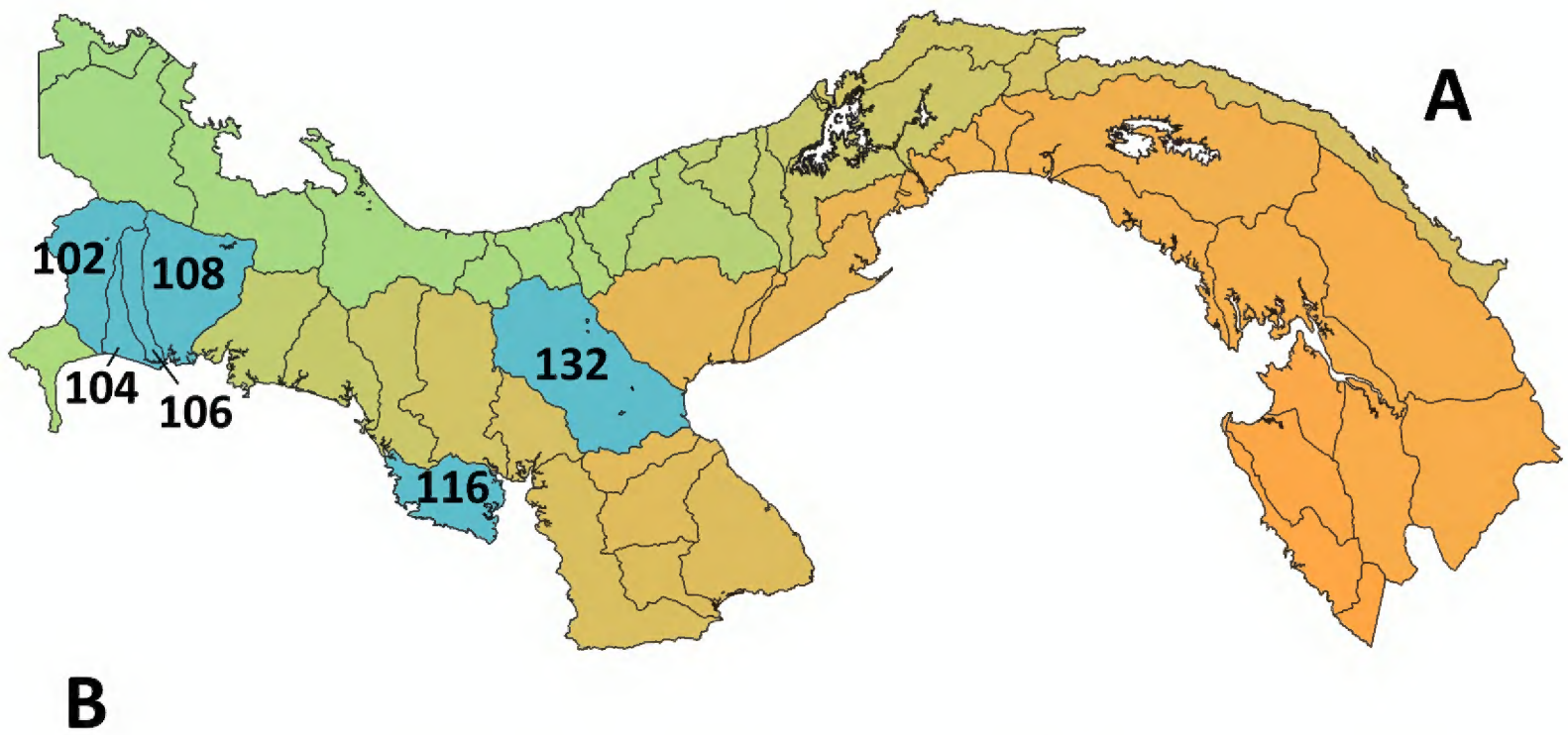

Figure 1. Maps of collection sites for new country records **A** map of Panama's major watersheds (cuencas), with those sampled shaded in blue and identified by cuenca number **B** map of sample locations. [A–Río Candela; B– Río Güigala; C– Río Chirigagua; D– Río Platanal; E– Quebrada del Tejar; F– Río Majagua; G–afluente Quebrada Arenal; H– Quebrada Monita; I– Río Beteguí].

Polyplectropus Ulmer, 1905, with more than 150 species, is most common in tropical and subtropical regions. In the Neotropical Region, approximately 98 species are known, with 13 species previously recorded from Panama (Holzenthal and Calor 2017). Herein we add one new country record.

Polyplectropus bravoae Bueno-Soria, 1990

Material examined. PANAMA, Veraguas Province • 2 ♂; in alcohol; Cuenca 132, San Francisco District, nr La Perdiz, N of San Francisco, Río Betegui; 8.36047°N, 80.99481°W; 144 m a.s.l.; LED UV light trap; 28 Jan. 2023; V. Rodriguez leg.; MUPADI.

Distribution. Belize, Costa Rica, Honduras, Mexico, Nicaragua, Panama. New country record.

Suborder Integripalpia Martynov, 1924
Superfamily Hydroptiloidea Stephens, 1836
Family Hydroptilidae Stephens, 1836

The microcaddisflies (Hydroptilidae) represent the largest of the 50 families of Trichoptera, with almost 2,700 species distributed in six subfamilies and 76 genera (Thomson 2023). By our internal count, Panama now has more than 250 species distributed in 21 genera, representing the highest country-level diversity in the Neotropics. In Panama, the genus *Bredinia* Flint, 1968 is represented by five species, three of which were added since 2015. The genus *Mayatrichia* Mosley, 1937 was added to Panama's fauna by Armitage et al. (2020), by recording the presence of *Mayatrichia illobia* Harris & Holzenthal, 1990. Herein we add one new country record for each of these genera.

Subfamily Hydroptilinae Botosaneanu, 1956
Tribe Neotrichiini Ross, 1956

***Mayatrichia ayama* Mosely, 1937**

Material examined. Panama, Chiriquí Province • ♂; in alcohol; Cuenca 108, Boquerón District, Río Chirigagua, Puente antes de llegar al Hotel Los Delfines; 8.48139°N, 82.54788°W; 128 m a.s.l.; UV light trap; 12 Feb. 2021; T. Ríos, Y. Aguirre leg.; MUPADI; • 7 ♂; in alcohol; ibid., 13 Mar. 2021; MUPADI; • 16 ♂; in alcohol; ibid., 12 Apr. 2021; MUPADI; • ♂; in alcohol; ibid., 18 Apr. 2021; MUPADI; • ♂; in alcohol; ibid., Cuenca 104, Bugaba District, Río Güigala, La Concepción; 8.51845°N, 82.64280°W; 209 m a.s.l.; UV light trap; 12 Feb. 2021; leg. T. Ríos, Y. Aguirre leg.; MUPADI; • 12 ♂; in alcohol; ibid., 12 Mar. 2021; MUPADI; • 17 ♂; in alcohol; ibid., 12 Apr. 2021; MUPADI; • 10 ♂; in alcohol; ibid., Cuenca 108, David District, Río Platanal, San Pablo Viejo, puente vía Interamericana antes de llegar a la entrada de Bagala; 8.46416°N, 82.52030°W; 84 m a.s.l.; UV light trap; 6 Oct. 2021; leg. T. Ríos, Y. Aguirre leg.; MUPADI; • 6 ♂; in alcohol; ibid., David, Via a Mantilla cerca del cementera de San Pablo Viejo, Quebrada del Tejar; 8.463110°N, 82.469554°W; UV light trap; 4 Mar. 2022; leg. T. Ríos; MUPADI.

Distribution. Canada, Costa Rica, Honduras, Mexico, Nicaragua, Panama, U.S.A. New country record.

Remark. In Panama, this species was most commonly collected in large, lowland rivers.

Subfamily Stactobiinae Botosaneanu, 1956
Tribe Stactobiini Botosaneanu, 1956

***Bredinia selva* Harris, Holzenthal & Flint, 2002**

Material examined. Panama, Veraguas Province • ♂; in alcohol; Cuenca 116, Las Palmas District, nr Pixvae, Quebrada Monita, nr Pixvae; 7.8158°N, 81.55674°W; 26 m a.s.l.; Malaise trap; 28 Jan. 2023; V. Rodriguez leg.; MUPADI.

Distribution. Costa Rica, Panama.

Superfamily Glossosomatoidea Wallengren, 1891
Family Glossosomatidae Wallengren, 1891

This family is represented in the Neotropics by 11 genera and more than 270 species (Holzenthal and Calor 2017; Blahnik and Armitage 2019). In Panama, three genera are known (*Culoptila* Mosley, 1954, *Mortoniella* Ulmer, 1906, and *Protoptila* Banks, 1904), and 31 total species. The genus *Mortoniella* has been treated comprehensively for the neotropics in a series of revisions by Blahnik and Holzenthal (2008, 2011, 2017). This genus is represented in Panama by 16 species (Flint 1974; Blahnik and Holzenthal 2008; Blahnik and Armitage 2019). Herein we add one new country record for this genus.

***Mortoniella stilula* Blahnik & Holzenthal, 2008**

Material examined. PANAMA, Veraguas Province • ♂; in alcohol; Cuenca 132, San Francisco District, nr La Perdiz, N of San Francisco, Río Betegui; 8.36047°N, 80.99481°W; 144 m a.s.l.; LED UV light trap; 28 Jan. 2023; V. Rodriguez leg.; MUPADI.

Distribution. Costa Rica, Panama. New country record.

Infraorder Brevitentoria Weaver, 1984
Family Anomalopsychidae Flint, 1981

The Anomalopsychidae Flint, 1981 was created to contain two genera, *Anomalopsyche* Flint, 1967 and *Contulma* Flint, 1969, and species of caddisflies formerly assigned to the Sericostomatidae. To date, *Anomalopsyche minuta* (Schmid, 1957) remains the sole representative of its genus. *Contulma cranifer* Flint, 1969 has been joined by several dozens of new species, most recently by Holzenthal et al. (2017; three new species from the Andes of Ecuador) and by Dumas (2018; one new species from the Atlantic Forest area of Rio de Janeiro State in southeastern Brazil). A total of 31 species are now assigned to this genus (Dumas 2018). In Panama, we have previously recorded the genus (Armitage et al. 2016), but the new species that supports that record is as yet undescribed. Herein we record a described species, *C. talamanca* Holzenthal & Flint, 1995, as a new country record for Panama.

***Contulma talamanca* Holzenthal & Flint, 1995**

Material examined. PANAMA, Chiriquí Province • ♂; in alcohol; Cuenca 093, Gualaca District, afluente Quebrada Arenal, Bosque Protector Palo Seco; 8.77650°N, 82.20897°W; 1044 m a.s.l.; UV light trap; 8 Oct. 2019; T. Ríos, Y. Aguirre leg.; MUPADI.

Distribution. Costa Rica, Panama. New country record.

Infraorder Brevitentoria Weaver, 1984
Family Helicopsychidae Ulmer, 1906

There are approximately 300 species in this family, found primarily in tropical habitats, with well over a third of these found in the Neotropical Region (Holzenthal and Calor 2017; Moreno et al. 2023). In Panama, 14 species have been recorded. Herein we register one new country record.

***Helicospyche planata* Ross, 1956**

Material examined. PANAMA, Chiriquí Province • ♂; in alcohol; Cuenca 108, Dolega District, Río Majagua, Potrerillos, Banquito de Palmira; 8.68093°N, 82.53276°W; 840 m a.s.l.; Malaise trap; 15 Apr. 2019; T. Ríos, Y. Aguirre leg.; MUPADI.

Distribution. Mexico, Nicaragua, Panama. New country record.

Infraorder Brevitentoria Weaver, 1984
Family Odontoceridae Wallengren, 1891

This small family of caddisflies (14 genera and ~120 species) are found in all faunal regions, but the greatest diversity in the Neotropics is represented by the genus *Marilia* Mueller, 1880 (Holzenthal and Calor 2017; Bueno-Soria and Rojas-Ascencio 2004). Panama currently has two species in its fauna (*M. flexuosa* Mosely, 1939 and *M. kingsolveri* Bueno-Soria & Rojas-Ascencio, 2004). Herein we register one new country record.

***Marilia crea* Mosely, 1949**

Material examined. PANAMA, Chiriquí Province • ♂; in alcohol; Cuenca 104, Bugaba District, Río Guigala, La Concepción; 8.51845°N, 82.64280°W; 209 m a.s.l.; UV light trap; 12 Feb. 2021; T. Ríos, Y. Aguirre leg.; MUPADI • ♂; in alcohol; ibid., Cuenca 102, Renacimiento District, Santa Clara, Río Candela; C102S27; 8.823561°N, 82.841127°W; 886 m a.s.l. LED UV light trap; 22 Feb. 2023; T. Ríos, Y. Aguirre leg.; MUPADI.

Distribution. Costa Rica, Panama. New country record.

Discussion

This is the seventh publication since 2015 solely devoted to recording new country records for Panama. It presages the production of a new checklist for the Trichoptera of this country, with the last such benchmark paper published in 2015 when Panama's fauna totaled 236 fewer species. The new paper (Armitage et al. in press) will provide graphics and analyses to further demonstrate the progress that has been accomplished for the period 2015–2024.

Current and future projects that sample completely new locations in Panama will no doubt necessitate future publications like this. In addition to placing these species "on the record" for other researchers as occurring in Panama,

these publications also serve to assist us in organizing and tracking what has proven to be a burgeoning and highly biodiverse fauna. The caddisfly fauna of Panama now totals 533 species in 15 families and 56 genera.

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Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

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Author contributions

Conceptualization: BJA. Data curation: BJA, YPA, TARG. Formal analysis: BJA. YPA, TARG, VR, RJB, SCH. Writing and editing (BJA). Funding acquisition: BJA.

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Data availability

All of the data that support the findings of this study are available in the main text.

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